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ART UNIT	**PAPER NUMBER**
1723	

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,390	KING, RONNALD B.	
	Examiner	Art Unit	
	Charles E. Cooley	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09082005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

FINAL OFFICE ACTION

Specification

1. The abstract is acceptable.

2. The title is acceptable.

Information Disclosure Statement

3. Note the attached PTO-1449 form(s) submitted with the Information Disclosure Statement filed 8 SEP 2005.

Specification

4. The abstract is acceptable.

5. The title is acceptable.

Claim Rejections - 35 U.S.C. § 112, second paragraph

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Newly presented claims 2-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Newly presented claim 2 is confusing and therefore indefinite since the claim recites that the vanes have an inner edge and an outer edge, said vanes having a first end and a second end, a first portion of each of said vanes at said first ends thereof positioned closer to said axis (e.g., near 134 in Fig. 6) than a second portion of said vanes at said second ends thereof (e.g., near 164 in Fig. 6). The claim then recites that said vanes at said second ends thereof are positioned closer to one another than said vanes at said first ends thereof which appears to contradict the previous language above since it appears that the vanes at the first ends (e.g., near 134 in Fig. 6) are positioned closer to one another (since the edges thereof are each radially closer to the axis of rotation) than the vanes at the second ends (e.g., near 164 in Fig. 6, since the edges thereof are radially further from the axis than the edges at the first ends).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by JANSSEN (US 4,444,510 issued 24 APR 1984).

With regard to claim 2, the patent to JANSSEN '510 discloses a method of mixing fluid comprising isolating a fluid to be mixed in a container 5; providing a mixing

structure (Figs. 1-2) comprising a shaft 1 extending along an axis, a support 2 mounted to said shaft for rotation therewith, a number of vanes 4 mounted for rotation with said support and extending outwardly from said support, said vanes having an inner edge and an outer edge, said vanes having a first end and a second end, a first portion of each of said vanes 4 (proximate 3) at said first ends thereof positioned closer to said axis than a second portion (proximate L) of said vanes at said second ends thereof, said vanes spaced apart from one another and defining openings there between through which fluid may flow (Figs. 1-2), said vanes at said first ends thereof positioned radially closer to one another than said vanes at said second ends thereof; positioning said structure in said container containing fluid to be mixed; and rotating said mixing structure within said fluid within said container 5, drawing said fluid into said mixing structure, moving said fluid towards said inner edges of said vanes at said first portions thereof, shearing said fluid as it impacts said inner edges of said vanes and passes through said opening between said vanes (as denoted by the flow arrows - see Figs. 2-4). The claim language "and trapping undispersed materials **if present** within said fluid at said second portions of said vanes within said mixing structure" (emphasis added) and thus the subject matter of claim 6 is considered a conditional or optional limitation (and thus is not necessarily part of the scope of the claimed invention) or a limitation dependent upon a variable (the presence or absence of undispersed materials in the fluid) and thus fails to define over JANSSEN since if the undispersed materials were not present, the trapping step would not occur.

The patent to JANSSEN further discloses the vanes 4 may be curved between their inner and outer edges at 10 in Fig. 2; wherein said first and second ends of said vanes 4 are arranged in a generally circular configuration (Figs. 1-2); wherein said openings between said vanes are curved since the vanes 4 may be curved as noted above.

With regard to claim 8, the patent to JANSSEN '510 discloses a method of mixing fluid comprising isolating a fluid to be mixed in a container 5; positioning a mixing structure (Figs. 1-2) in said container 5 containing fluid to be mixed; rotating said mixing structure in said container about an axis; drawing fluid into an interior area of said mixing structure; expelling fluid towards a first portion of vanes 4 of said mixing structure, said first portion of said vanes positioned outwardly of said axis about which said mixing structure is rotated, said fluid being sheared as it impacts said first portion of said vanes and being expelled through openings between said vanes. The claim language "and trapping undispersed materials **if present** in said fluid at a second portion of said vanes which are positioned closer to said axis that said first portion of said vanes" (emphasis added) and thus the subject matter of claim 12 is considered a conditional or optional limitation (and thus is not necessarily part of the scope of the claimed invention) or a limitation dependent upon a variable (the presence or absence of undispersed materials in the fluid) and thus fails to define over JANSSEN since if the undispersed materials were not present, the trapping step would not occur. Furthermore, with regard to claim 12 and assuming the removal of the mixing structure is contingent upon the undispersed trapped materials being present in the mixing

structure, the mixing structure of JANSSEN is inherently removable from the vessel for cleaning, maintenance, replacement, etc. purposes.

The patent to JANSSEN further discloses the vanes 4 have a first end (proximate L) and a second end (proximate 3) and said first portion of each of said vanes is located at said first end of each of said vanes and said second portion of each of said vanes is located at said second end of each of said vanes; including the step of expelling said fluid as denoted by the flow arrows (see Figs. 2-4) through curved openings between said vanes since the vanes 4 may be curved at 10 in Fig. 2; wherein said second portions of said vanes are connected to said support 2 (Fig. 1); wherein said support 2 is plate-like in configuration (Fig. 2); wherein said vanes 4 disposed on the bottom of the support 2 as seen in Fig. 1 have a top end and a bottom end and an inner edge and an outer edge, said inner edges of said vanes at said top ends being positioned closer to said axis than said inner edges of said vanes at said bottom ends.

More specifically, the patent to JANSSEN discloses a disc or plate is provided perpendicular to the axis, to which, on one or both sides of said disc or plate, the stirring blades are affixed, in form of substantially right-angled triangles having the longer base directed radially and the shorter perpendicular, parallel to the axis, lying as the extreme edge at the greatest distance from the axis, the number of stirring blades on one disc side mounting to at least 8, the height of the extreme blade edge being equal to 0.5 to 2 times the perpendicular distance of the extreme end of one blade to the successive blade, and the length of the blades, measured along their hypotenuse, amounting at least twice the height thereof.

The inventive concept is based upon the insight that the pumping action depends on the shape of the blades and on a relationship between the height of the extreme edge of the blades and the relative distance of the blades at the location of this extreme edge. By applying triangular rather than trapezium shaped blades it turns out that the conical whirl and also the centrifugal flow are enhanced. By particular ratios in shape and dimensions of the blades the space between two blades is for the greater part filled or closed by the conical tipping whirls, by which the pumping action becomes optimum. This is attained particularly when the ratio between the height of the extreme edge and the perpendicular mutual distance gets a value between 0.8 and 1.25 or, still better, when these dimensions become substantially equal to one another.

Furthermore, it has turned out that, to the extent that the number of blades is increased, so the (angular) distance between the blades becomes smaller, the height of the extreme edge of the blades should be correspondingly decreased in order to still obtain an optimum filling of the space between the blades with the conical whirls. It turns out to make no sense to apply, with a certain spacing between the blades, a much greater height of the edge. The conical whirls in that case do not go down deep enough between the blades, by which they influence each other, so that their strength decreases and the pumping action falls off. When the height of the edge becomes much smaller than the mutual spacing, a relatively small portion of the liquid which is tipping over the blade edge will arrive in the conical whirl, by which also the pumping action declines.

The effectiveness of mixing turns out to be improved, however, by increasing the number of blades, because therewith also the number of corkscrew whirls formed is increased. It has turned out that an increase in the number of blades from 8 to 12, or even to 18, results in a further improvement of the mixing action.

Finally it has turned out that, even with the same number of blades and length and height of the blades, the ratio between the strength of the disengaging corkscrew whirls and the centrifugal and pumping action can be influenced by changing the shape of the blades, to wit in any of the following two manners:

By making the hypotenuse or top edge of the blades slightly convex rather than straight, the centrifugal action is increased, and by making it concave is decreased. So the circulation is influenced by this.

By making the blades not accurately radial but orient them slightly forward or rearward relative to the sense of rotation of the stirrer, the strength of the tipping whirl is influenced, and thereby the mixing intensity.

Something similar can also be attained by bending the blades in vertical direction--i.e. perpendicular to the disc--slightly forwardly or rearwardly from the radial plane.

An important application of the inventive concept lies with a centrifugal impeller. This is a well known device which is mounted at the end of a driven hollow spindle for the supply of a fluid, and ending in a narrow circumferential slit through which, by rotation, the fluid supplied will leave the impeller.

This impeller may be provided with stirring blades as defined above, the radial length of the blades being substantially equal to the radial dimension of the centrifugal impeller.

With such centrifugal impeller a very good mixing, aeration or suspending can be obtained in an efficient manner. The thin film or liquid or air which comes out at the narrow circumferential impeller slit is broken up, by the fluid which is swung outwardly between the stirring blades and which is filled with corkscrew whirls, into very small particles, which will quickly be dispersed evenly.

When high viscosity liquids are to be mixed or aerated it has turned out to be favorable to do so in a vessel in which several stirrers according to the invention are mounted above one another on one driving spindle, and this with a spacing of one or two stirrer diameters so that a multiple stirrer or multi stirrer is produced. By this the vessel is virtually divided, in vertical direction, into compartments, each of which has a particular strength of the circulatory flow.

As is quite common a number of vertical baffles must be provided at the inside of the vessel, regularly divided over the circumference, in order to prevent that the whole contents of the vessel with start to turn along with the stirrer as a solid body, by which naturally the pumping action, and therefore also the mixing, would stop entirely.

With certain applications of the multi stirrer according to the invention it turned out to be of great importance that in a certain part of the mixing vessel one may obtain a stronger mixing and circulatory flow than in an other part, or that a more intense exchange of matter between the compartments is attained.

The former can be attained by making the number of blades on either side of the disc different, for example 8 high blades on one side and 12 or 18 blades on the other side, or no blades at all on one of the sides. The effect in form of a difference in mixing action can be further strengthened yet by giving the blades on the two sides different lengths, so that the centrifugal action, and therefore also the pumping action, will become different. It turns out that an improved exchange of matter can be attained by not arranging the blades on either side of the disc in the same radial planes, but for example those on one side centrally between those on the other side. The corkscrew whirls originating from the two sides of the disc will then be offset relative to one another, by which the exchange of fluid in the neighboring circulation compartments of the mixing vessel will be strongly enhanced.

Finally it has turned out that, particularly for high viscosity liquids, it may be advantageous when the points of the triangular blades touching the spindle are truncated, so that right angled trapezium shaped blades are produced.

The side of the trapezium between the two right angles which is contiguous with the disc, should then be long relative to the height of the outer circumference of the stirrer, to wit at least 1.5 times as big, in order to maintain a sufficient centrifugal action. By such truncating the supply and influx of the viscous medium between the blades close to the spindle is made easier, so that an improved pumping action is obtained.

In FIGS. 1 and 2 a driving shaft 1 is visible to which a disc 2 is attached by means of a pin or locking bolt 3. On this disc on either side triangular blades 4, eight in number, are mounted radially directed. This stirrer, is placed in a substantially cylindrical

vessel 5 which is provided at its circumference with vertical braking baffles 6, eight in number. Instead of to a disc the blades may also be mounted on a plate which has been cut into star shape, as schematically indicated at 2'.

The blades are substantially right angled triangles, the height h of which at the outer circumference is about equal to the perpendicular distance a from the extreme edge of one blade to the next blade. The hypotenuse or top edge L of the blades is at least twice the height h.

In FIG. 1 it is indicated schematically at 11 and 12 that this top edge, instead of straight may alternatively be realized concave or convex.

In FIG. 1 it is also indicated schematically at 13 that the blades, instead of being realized as a flat plane, alternatively may be bent in vertical direction, and this both opposite to and in the same sense of rotation as the impeller.

Furthermore in FIG. 2 at 9 and 10 it is indicated schematically that the blades instead of accurately radially may alternatively be directed somewhat tangentially or curved, respectively, and this both opposite to and in the same sense of rotation as the stirrer.

In both figures it is indicated schematically at 7 that the blades may be truncated at their top near the spindle. The radial length L of the blades should in that case, however, still amount to at least one and a half time the blade height h.

Finally in both figures it is indicated schematically by a broken line at 8 that the blades on one side of the disc may be arranged offset i.e. in different radial planes, relative to those on the other side.

In FIG. 3 it is indicated how the stirrer can be combined with a centrifugal impeller 14 having blades 15 and being mounted at the extremity of a hollow shaft 16. On one or the two outer surfaces of this impeller the stirrer blades 17 are provided. The fluid which is present in the vessel can be mixed, by means of this centrifugal stirrer, with a gas or liquid, which is supplied through the hollow spindle and leaves the impeller as a film through the thin circumferential slit 18. This film is broken up into fine particles by the fluid which is swung outwardly between the stirrer blades and it is mixed intensely with the fluid by the corkscrew whirls.

In FIGS. 2 and 3 the flow between the stirrer blades is indicated schematically. Along the leeside top edge of each blade at the point near the spindle a tipping whirl arises, which toward the circumference progressively increases in strength and dimensions. Passing over this whirl fluid is taken to the leeside lower portion of the blade surface, after which it is swung outwardly by centrifugal action. The fluid which enters the whirl is transported also, by this centrifugal action but moreover to a great extent by the course of the pressure in the conical whirl, transported at a great speed to the circumference of the impeller.

Because the pumping action is the most intense in the whirl, it is therefore most favorable for the effectiveness of this stirrer, when the whirl will fill the space between two successive blades to the greater part. This explains the optimum proportion for the dimensions of the two stirrer blades mentioned for this invention.

In FIG. 4 it is indicated schematically how a plurality of stirrers 19, 20 and 21 can be mounted on one driving shaft 22 in a vessel 23 and thus constitute a multi stirrer.

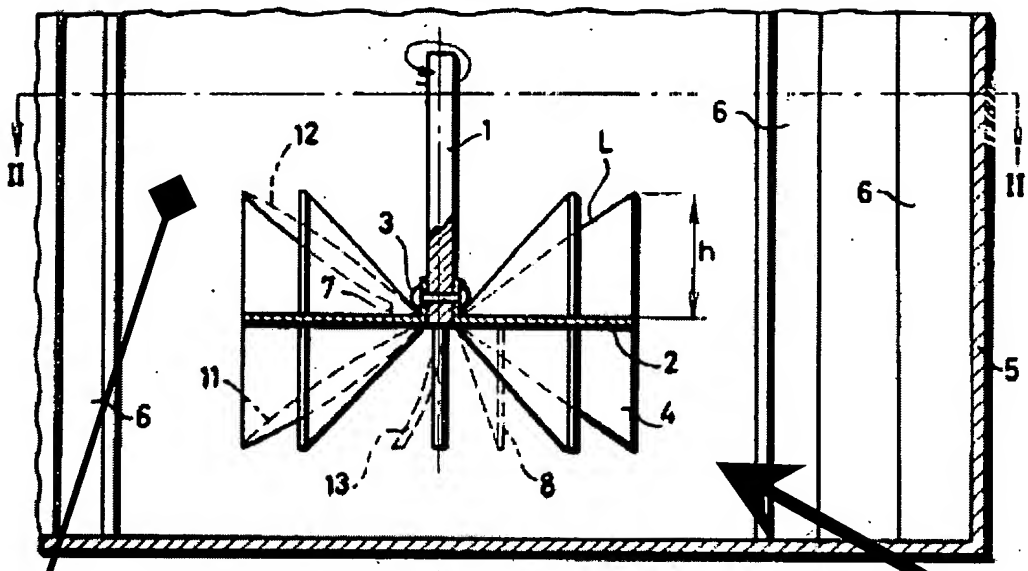
Also it is shown that these stirrers may have a different number of blades of different dimensions on either side of the disc. Thereby the circulation and mixing in each of the compartments 24, 25 and 26 of the vessel between two successive stirrers may be different.

Because stirrer 19 is only "half" a stirrer, i.e. only has blades on one side of the disc, there will not occur mixing in compartment 24. In compartment 25 there is some mixing and in compartment 26 the most intense circulation prevails and therefore mixing is the fastest. As a matter of course various combinations in the order of mixing action in compartments of a vessel can be obtained depending on the requirements of the mixing process concerned. Also as a matter of course it is possible that one or more stirrers are realized as a centrifugal stirrer, the supply of the fluid to be admixed thereby occurring through the hollow driving spindle.

* * *

U.S. Patent Apr. 24, 1984 Sheet 1 of 2 4,444,510

Fig. 1.



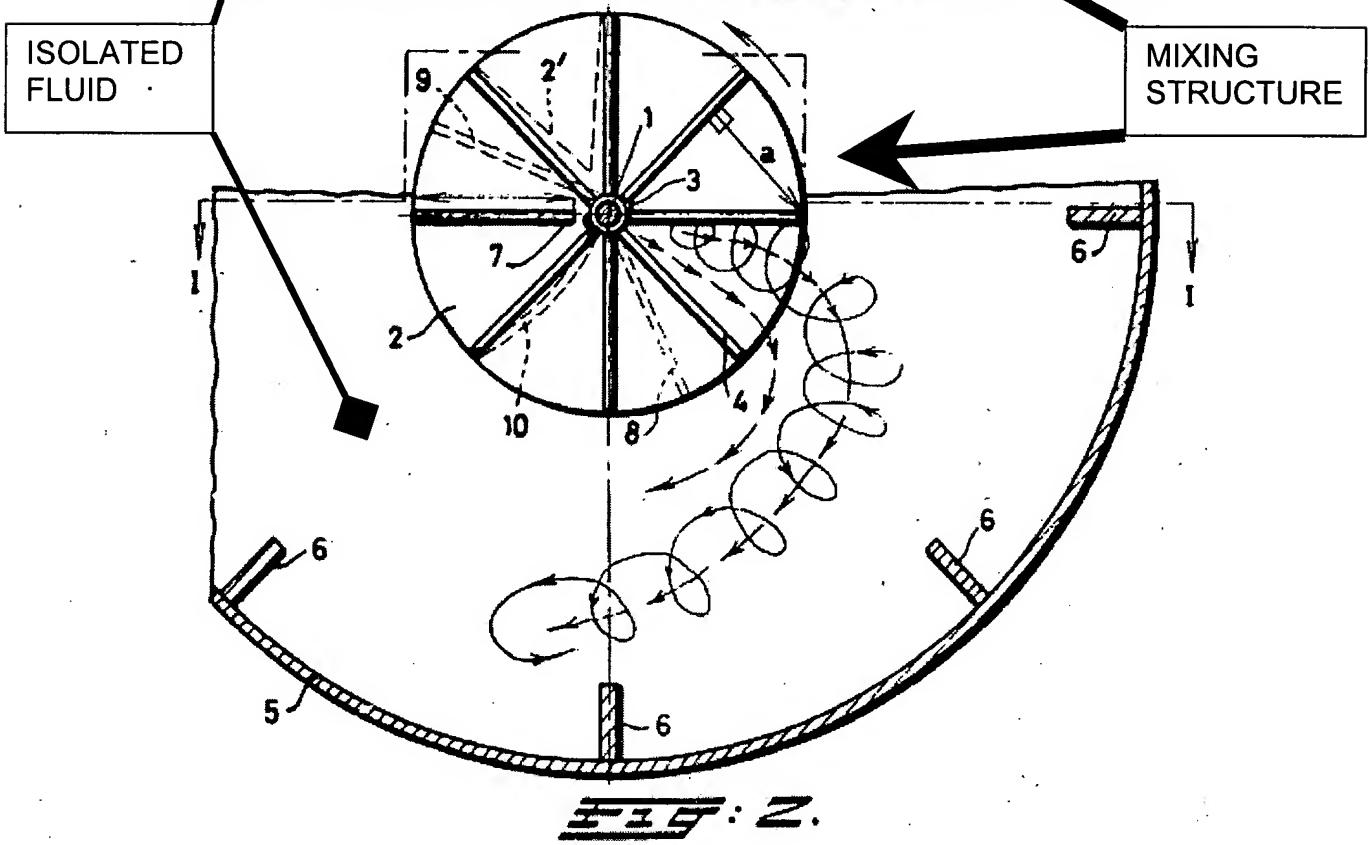


Fig. 2.

Claim Rejections - 35 U.S.C § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over JANSSEN (US 4,444,510).

JANSSEN teaches that the number of vanes disposed on the support may vary within wide limits as noted above which would necessarily influence the spacing between adjacent vanes. JANSSEN does not disclose the recited spacing of claim 3. With respect to the limitation of this vane spacing parameter which is present in the claim at issue, the examiner has found that the specification contained no disclosure of any unexpected results arising from such parameter, and that as such the parameter is arbitrary and therefore obvious. Such unsupported limitations cannot be a basis for patentability, since where patentability is said to be based upon particular chosen parameters or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990) and see MPEP 2144.05.

With respect to the limitation of the recited vane spacing and in view of the explicit suggestion in JANSSEN that the number of vanes and thus the spacing between the vanes may vary within wide limits, it would have been obvious to one of ordinary skill in the art to have provided the device defined by the disclosure of JANSSEN with the vane spacing dimension recited in the claim which is considered at most an optimum choice, lacking any disclosed criticality.

Applicant has the burden of proving such criticality. *In re Swenson et al.*, 56 USPQ 372; *In re Scherl*, 70 USPQ 204. However, even though applicant's modification may result in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art. *In re Sola*, 25 USPQ 433; *In re Normannet et al.*, 66 USPQ 308; *In re Irmscher*, 66 USPQ 314. More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Swain et al.*, 70 USPQ 412; *Minnesota Mining and Mfg. Co. v. Coe*, 38 USPQ 213; *Allen et al. v. Coe*, 57 USPQ 136.

No probative evidence is of record to demonstrate that the dimensions and/or other variables of the invention are significant or are anything more than one of numerous dimensions a person of ordinary skill in the art would find obvious for purposes of merely changing the configurations and/or dimensions to obtain different results. *Graham v. John Deere Co.*, 148 USPQ 459.

12. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over JANSSEN (US 4,444,510) in view of WATKINS (US 5,261,745).

JANSSEN teaches that the mixing structure is suitable for mixing/homogenizing viscous fluids but does not disclose paint in particular. WATKINS discloses a method of mixing/homogenizing a viscous fluid such as paint 12 disposed in a paint can 10 via a vaned mixing structure 24. Since JANSSEN explicitly teaches that the mixing structure thereof is most suitable for mixing viscous fluids, it would have been obvious to one having ordinary skill in the art, at the time applicant's invention was made, to have provided the method of JANSSEN with paint in the vessel (or paint can) as taught by WATKINS for the purpose of mixing and homogenizing a fluid such as paint.

Response to Arguments

13. Applicant's arguments with respect to claims 2-16 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles E. Cooley whose telephone number is (571) 272-1139. The examiner can normally be reached on Mon-Fri. All official facsimiles should be transmitted to the centralized fax receiving number 571-273-8300.

16. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles E. Cooley
Primary Examiner
Art Unit 1723

23 September 2005